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SECRET/NF - GRAIN HANDLING CAPABILITY AT SOVIET PORTS

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Grain Handling Capability at Soviet Ports

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GRAIN HANDLING CAPABILITY AT SOVIET PORTS

OVERVIEW

1. We estimate that Soviet ports could handle as much as 36 million metric tons of grain imports spread over 12 months without serious problems. Since Soviet grain purchases will certainly be below this level, port capacity will not be a bottleneck.

2. The four main Soviet ports – Odessa, Leningrad, Ilichevsk, and Novorossiysk – have a combined annual capacity well in excess of 24 million tons of grain imports. This rate was observed during the summer of 1973, when grain imports peaked. We also know of 14 other ports that have been used to unload grain in the past few years (see the Appendix).

3. The task of handling large quantities of grain will not be problem free. While the Soviets do have adequate railroad cars and barges to move grain imports inland, they had difficulty in developing efficient schedules in the 1973 import boom. This time, similar problems are expected. However, the Soviets have more railcars available and imports are not expected to peak until after the harvest season, freeing railcars for use at the ports. Also, railcars normally used to haul grain to Eastern Europe will be available because Soviet deliveries to these countries will fall short of past levels.

DISCUSSION

4. To estimate grain handling capacity at selected Soviet ports, the following factors were considered:

- number of berths available for grain imports,
- unloading rate,
- ship turnaround time and average deliveries,

Note: This memorandum is a joint project between the Office of Economic Research and [redacted] Comments and queries are welcomed. 25X1D
25X1A They may be directed to [redacted] of OER (Code 143,
Extension 5741) for additional information on the methodology and to [redacted] 25X1A
25X1A [redacted] (Code 143, Extension 3168) for additional
[redacted] 25X1D 25X1D

- port working hours,
- inland transportation capacity, and
- grain storage capacity.

Availability of Berths

5. To determine the number of berths that could be used for Soviet grain imports, the first step was to count the maximum number of ships delivering grain at major Soviet ports. To obtain these data, we used information published by The Baltic and International Maritime Conference (BIMCO) on 11 ports[1] for the 1973 peak lift period – July, August, and September. As shown in Table 1, 50 berths were available.

Table 1

Availability of Berths To Unload Grain at Selected Soviet Ports[1]

Port	Maximum Ships Berthed	Peak Dates
Total	**50**	
Black Sea		
Odessa	8	Jul-Sep
Novorossiysk	7	Jul
Ilichevsk	7	Jul
Poti	2	Jul-Sep
Batumi	1	Same during most of 1973
Baltic		
Leningrad	8	Jul and Aug
Klaipeda	5	Aug
Riga	4	Jul
Ventspils	3	Aug and Sep
Tallinn	2	Jul
Pacific		
Nakhodka	3	Jul and Aug

1. Data based on weekly Baltic and International Conference (BIMCO) reports.

1. Data based on weekly Baltic and International Conference (BIMCO) reports. For a complete listing of BIMCO reporting on grain ships discharging and waiting at selected Soviet ports, see Table 2.

Table 2

Grain Ships at Selected Soviet Ports During Peak Months of 1973 Grain Imports[1]

Ports	Ships									
	4 Jul	11 Jul	18 Jul	25 Jul	8 Aug	15 Aug	22 Aug	29 Aug	5 Sep	19 Sep
Number unloading and waiting	27/19	31/22	40/16	39/26	28/37	36/32	37/29	32/24	31/23	27/15
Total ships	46	53	56	65	65	68	66	56	54	42
Black Sea										
Odessa	8/4	8/3	8/4	8/4	6/9	6/9	8/6	8/6	8/8	8/2
Novorossiysk	3/5	5/5	7/4	7/8	4/5	5/3	4/2	5/2	[2]	4/4
Ilichevsk	2/2	3/3	7/3	4/4	4/6	4/6	4/5	4/2	4/4	3/4
Poti	1/1	1/0	2/0	1/1	1/1	2/0	2/0	2/0	1/0	2/1
Batumi	1/0	1/1	0/1	1/0	1/1	1/0	1/1	0/1	1/0	1/1
Baltic										
Leningrad	4/2	5/2	6/2	8/4	6/5	8/4	7/3	4/2	6/1	3/1
Klaipeda	1/2	1/1	2/0	1/1	1/1	3/3	5/4	3/4	3/2	2/0
Riga	2/0	3/0	3/1	4/3	2/4	2/4	2/3	2/2	3/1	2/2
Ventspils	2/1	2/3	2/0	2/0	2/4	2/3	3/5	3/4	3/7	0/0
Tallinn	2/0	1/1	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
Pacific										
Nakhodka	1/2	1/3	3/1	3/1	1/1	3/0	1/0	1/1	2/0	2/0

1. Source: The Baltic and International Maritime Conference (BIMCO), Copenhagen, Denmark.
2. Not reported.

6. Berths at seven other Soviet ports used to import grain in 1973 but not covered by BIMCO were then added. This information was derived from a variety of sources and is as follows:

7. Combining berths used during the peak months of the 1973 lift with estimated berthing space at other ports yields a total of 73 berths at 18 ports.

Port	Number of Berths Handling Grain
Total	**23**
Black Sea	
Nikolayev	3
Tuapse	3
Kherson	3
Zhdanov	2
Baltic	
Kaliningrad	6
Baltiysk	3
Pacific	
Vladivostok	3

25X1D

8. [redacted] of the 18 ports for the July 1972 - July 1975 period was exploited to confirm the above data. In general, both sources indicate similar patterns of berthing availability – industry sources and other data showing 73 berths and

25X1D [redacted] 69. Table 3 lists berthing data derived from [redacted] 25X1D

Unloading Capabilities

9. Our estimate of unloading rates is derived from the actual experiences of US shippers involved in 1973 grain deliveries to the Soviet Union. These reports

Table 3

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[redacted] Evidence of Berths Used for Grain Imports at Soviet Ports

Port	Total Berths	Berths Available for Grain Imports: Fixed Grain	Berths Available for Grain Imports: General Cargo[1]	Berths Available for Grain Imports: Total
Total	**540**	**26**	**43**	**69**
Black Sea	196	15	22	37
Odessa	37	4	8	12
Novorossiysk	43	4	5	9
Ilichevsk	24	0	3	3
Poti	14	1	2	3
Batumi	6	0	2	2
Nikalayev	28	2	2	4
Tuapse	10	0	0	0
Kherson	12	2	0	2
Zhdanov	22	2	0	2
Baltic	267	10	17	27
Leningrad	89	3	3	6
Klaipeda	30	0	1	1
Riga	46	2	2	4
Ventspils	23	2	2	4
Tallinn	31	0	5	5
Kaliningrad	48	3	3	6
Baltiysk	12[2]	0	1[3]	1
Pacific	77	1	4	5
Nakhodka	37	1	2	3
Vladivostok	40	0	2	2

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1. General cargo berths available for grain imports represent the maximum number of such berths used for grain imports a[redacted] at any one time. 25X1D

25X1D 2. Baltiysk is primarily a naval port. The 12 berths listed are for small lighters at the general cargo pier, which [redacted] The 12 are not included in the total.

25X1D 3. [redacted] floating crane unloading a grain ship at an anchorage outside port, with barges carrying grain to general cargo deck in port.

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indicate that unloading rates ranged from 1,500 tons to 8,000 tons per day. We used an unloading rate of 2,500 tons a day at major ports – Odessa, Leningrad, Ilichevsk, and Novorossiysk – because the majority of the reports stated this was the most common unloading rate. At other ports a rate of 1,750 tons a day was used on the assumption that their grain handling facilities and operations are less sophisticated than at the four largest ports.

Turnaround Times and Average Deliveries

10. Information on ship turnaround times is also derived from the actual experiences of ship operators during 1973 at five major ports – Odessa, Leningrad, Ilichevsk, Novorossiysk, and Vladivostok. Reports from these contacts indicate that the average time to unload a ship ranged from 7 to 10 days, depending on the availability of railcars or unloading equipment, while total turnaround time averaged around 15 days, a reflection of the time needed to position ships at the berths and, if needed, to lighter them to appropriate drafts. Turnaround time reached 22.7 days during the peak import months of July-September and was 15.5 days or less during other months. Average load deliveried during 1973 – 24,700 tons – was calculated by taking an average of actual deliveries to the five major ports in 1973 (see Table 4).

Table 4

Average Load and Daily Turnaround Time at Selected Soviet Ports

Port	Average Load in 1973 (Thousand Metric Tons)	Daily Average Turnaround Time During 1973	Daily Average Turnaround Time During Peak Imports Jul-Aug 1973
Total	123.6	77.4	90.7
Odessa	30.2	18	29
Novorossiysk	28.2	21	30
Ilichevsk	29.3	15	17
Leningrad	21.6	13.4	14.7
Vladivostok	14.3	10	N.A.
Average	24.7	15.5	22.7

Length of the Workday

11. It is assumed that grain unloading at Soviet ports would continue for 16 hours a day. During the 1973 lift, 16-hour days were the rule except during the peak of July-September, when 24 hour unloading was in effect at certain Soviet ports. SOVFRACHT officials have stated that during the upcoming 1975-76 grain lift, ports would be open 16 hours a day.

Inland Transportation

12. All Soviet ports used for grain imports are connected to the national rail and road networks. In addition, 10 of the ports are located near navigable rivers, providing inland access by barge.

13. A major constraint in moving grain at some Soviet ports during 1973 was shortages of railcars. Management and scheduling problems caused these shortages, not a lack of railcars. While not chronic, serious shortages occurred at some ports in July and August 1973. These were peak months of demand for railcars because of heavy imports and the need to move the harvest to processing centers.

14. The Soviets have added more than 50,000 box cars and gondolas since 1973. Operating efficiency has improved because the Soviets are using more unit trains to move grain and have introduced a computerized train routing and scheduling system. Even so, the Soviets will have operational problems handling a sudden surge in grain imports, especially if schedules are not rigorous and management is inefficient. To take account of such problems, we used a 240-day year in the port capacity calculations.

Grain Storage Capacity

15. Eleven of the 18 ports under consideration in this study have some form of grain storage. At the other seven ports the lack of grain storage does not preclude grain imports, because offloading is possible at general cargo berths or onto barges. In this study, grain storage is estimated at 810,000 tons and is not considered a limiting factor, because grain has been observed being offloaded in a variety of ways – directly into railcars, barges, or trucks for further movement inland – at different berths, often bypassing the fixed grain storage facilities. Table 5 –

25X1D [redacted] – lists grain storage facilities available at Soviet ports.

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Table 5

Grain Storage at Soviet Ports

Port	Storage Facilities	Estimated Capacity (Thousand Metric Tons)
Total		810
Black Sea		
Odessa	2 72-silo grain elevators 1 large grain storage building	110
Novorossiysk	2 50-silo grain elevators 8 flat grain storage buildings 1 grain handling building	150
Ilichevsk	None	
Poti	1 24-silo grain elevator[1] 2 large grain handling/storage buildings	40
Batumi	None	
Nikolayev	2 grain elevators, total number of silos at least 220	150
Tuapse	None	
Kherson	1 55-silo grain elevator 8 small grain silos 5 flat storage buildings	90
Zhdanov	1 55-silo grain elevator 6 flat storage buildings	100
Baltic		
Leningrad	1 16-silo grain elevator 2 large grain storage buildings	30
Klaipeda	None	
Riga	1 60-silo grain elevator 1 flat storage building 1 large storage buildings,	50

1. Built since 1972-73 grain lift.

Table 5

Grain Storage at Soviet Ports
(Continued)

Port	Storage Facilities	Estimated Capacity (Thousand Metric Tons)
Baltic		
Ventspils	3 flat storage buildings 2 grain handling buildings	50
Tallinn	None	
Kaliningrad	3 large storage buildings	30
Baltiysk	None	
Pacific		
Nakhodka	1 grain handling building, no storage observed	10
Vladivostok	None	

Calculations

16. On the basis of the above variables, we first estimated the grain handling capacity of Soviet ports by using the average turnaround time as our key variable. This result was then tested by calculating port capacity by an alternative means -- daily unloading rates. The calculations are as follows:

Average Turnaround Time

1.	Average number of ships a berth can handle a year	
	(a) 15.5-day turnaround[2] divided into 365 days	23.5 ships
	(b) 22.7-day turnaround divided into 365 days	16.1 ships
2.	Average load delivered during 1973	24,700 tons
3.	Tons per berth per year	
	(a) (1a x 2)	581,000 tons
	(b) (1b x 2)	398,000 tons
4.	Total berths available	73[3]
5.	Total annual grain handling capacity	
	(a) (3a x 4)	42.4 million tons
	(b) (3b x 4)	29.1 million tons
6.	Average total grain handling capability (Midpoint of 5a and 5b)	35.8 million tons

Unloading Rates

Port Capacity Using BIMCO and Estimated Data on Berth Availability

1.	Maximum observed number of berths used to discharge grain at Odessa, Leningrad, Ilichevsk and Novorossiysk, July-August 1973.	30
2.	Daily unloading rate	2,500 tons
3.	Total unloading rate a day at major grain ports (1 x 2)	75,000 tons
4.	Other berths used for grain at remaining ports	43

2. As mentioned above, actual time to unload a ship during 1973 ranged from 7 to 10 days, with the 15-day total turnaround time closer to actual experience.

3. Using the 69 berths [redacted] would yield a range of 27.5 million tons to 40.1 million tons.

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5.	Daily unloading rate at remaining ports	1,750 tons
6.	Total unloading rate a day at remaining grain ports (4 x 5)	75,250 tons
7.	Total daily unloading rate (3 + 6)	150,250 tons
8.	Total annual unloading rate, based on a 240-day year	36.1 million tons

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Port Capacity Using [redacted] *Evidence of 69 Berths Available*

1.	Maximum number of berths used to discharge grain at Odessa, Leningrad, Ilichevsk and Novorossiysk	
25X1D	[redacted]	30
2.	Daily unloading rate	2,500 tons
3.	Total unloading rate a day at major grain ports (1 x 2)	75,000 tons
4.	Other berths used for grain at remaining ports	39
5.	Daily unloading rates at remaining ports	1,750 tons
6.	Total unloading rate a day at remaining grain ports (4 x 5)	68,250 tons
7.	Total daily unloading rate (3 + 6)	143,250 tons
8.	Total annual unloading rate, based on a 240-day year.	34.4 million tons

APPENDIX

SOVIET GRAIN PORTS

Grain Handling Equipment

Soviet grain unloading equipment includes suction transfer barges, portable suction evacuators, quay cranes mounted with grab buckets, and ships' cranes. Suction transfer barges -- each capable of moving an estimated 400 tons of grain per hour -- have been observed at Odessa, Nikolayev, and Kherson. In addition, floating cranes are used to offload to barges. These have been seen at Kaliningrad and Baltiysk. Use of these transfer barges allows simultaneous ship-to-shore and ship-to-barge offloading operations.

Portable suction evacuators provide a flexible means of discharging grain at bulk and general cargo piers as well as at fixed grain piers. The Soviets purchased more than 150 diesel and electric-powered evacuators from the United States and West Germany in 1972 to expand grain handling capabilities at their ports. While each evacuator has a rated capacity of 50 tons per hour, the Soviets experienced rates of 20 tons per hour during the 1973 lift.

Quay cranes mounted with grab buckets have varying handling capacities, depending on the bucket size, which ranges between one and five tons. These and ships' cranes have been observed at various ports unloading grain onto rail cars and barges. [redacted] various grain handling techniques at scheduled Soviet ports.

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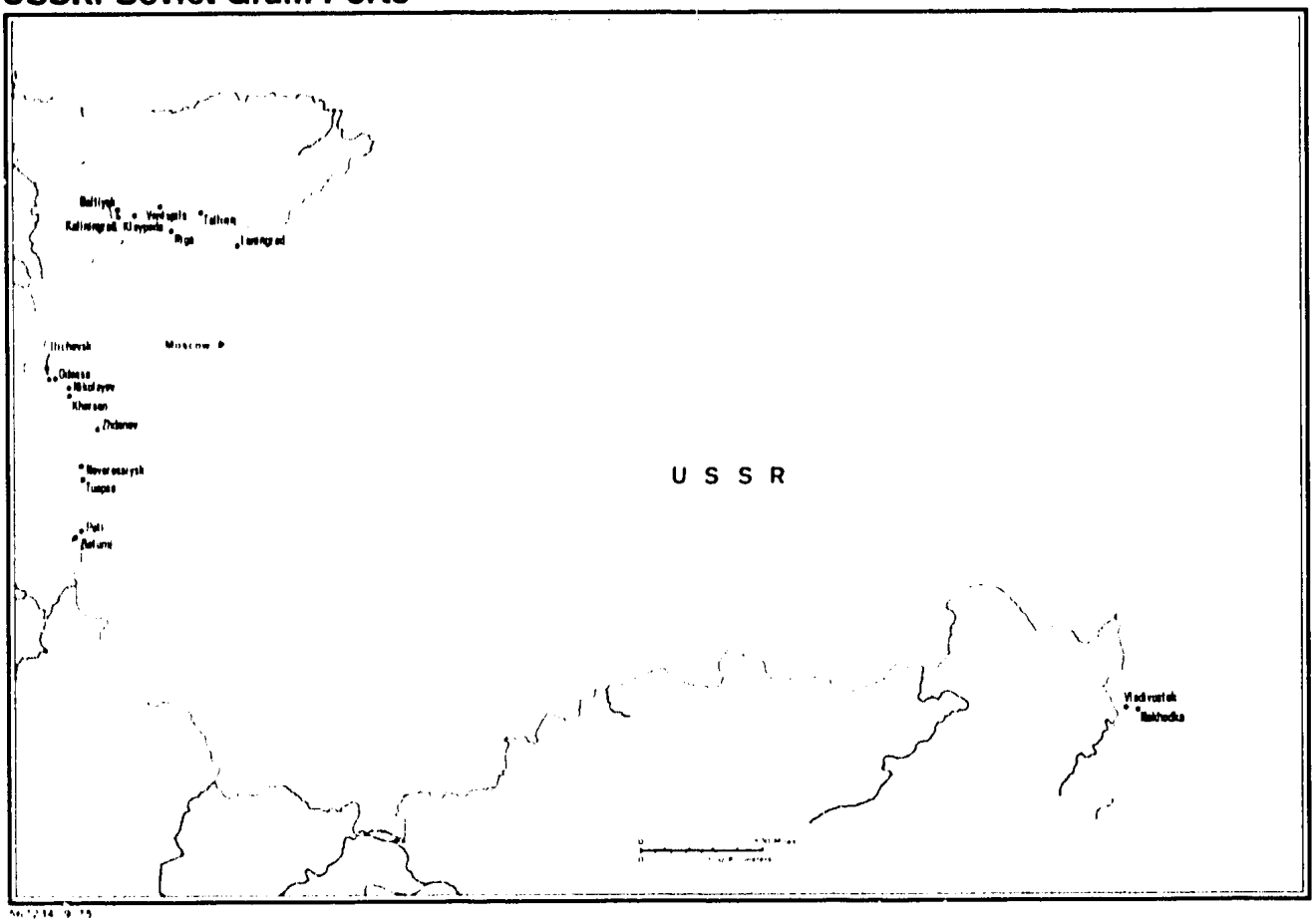
USSR: Soviet Grain Ports



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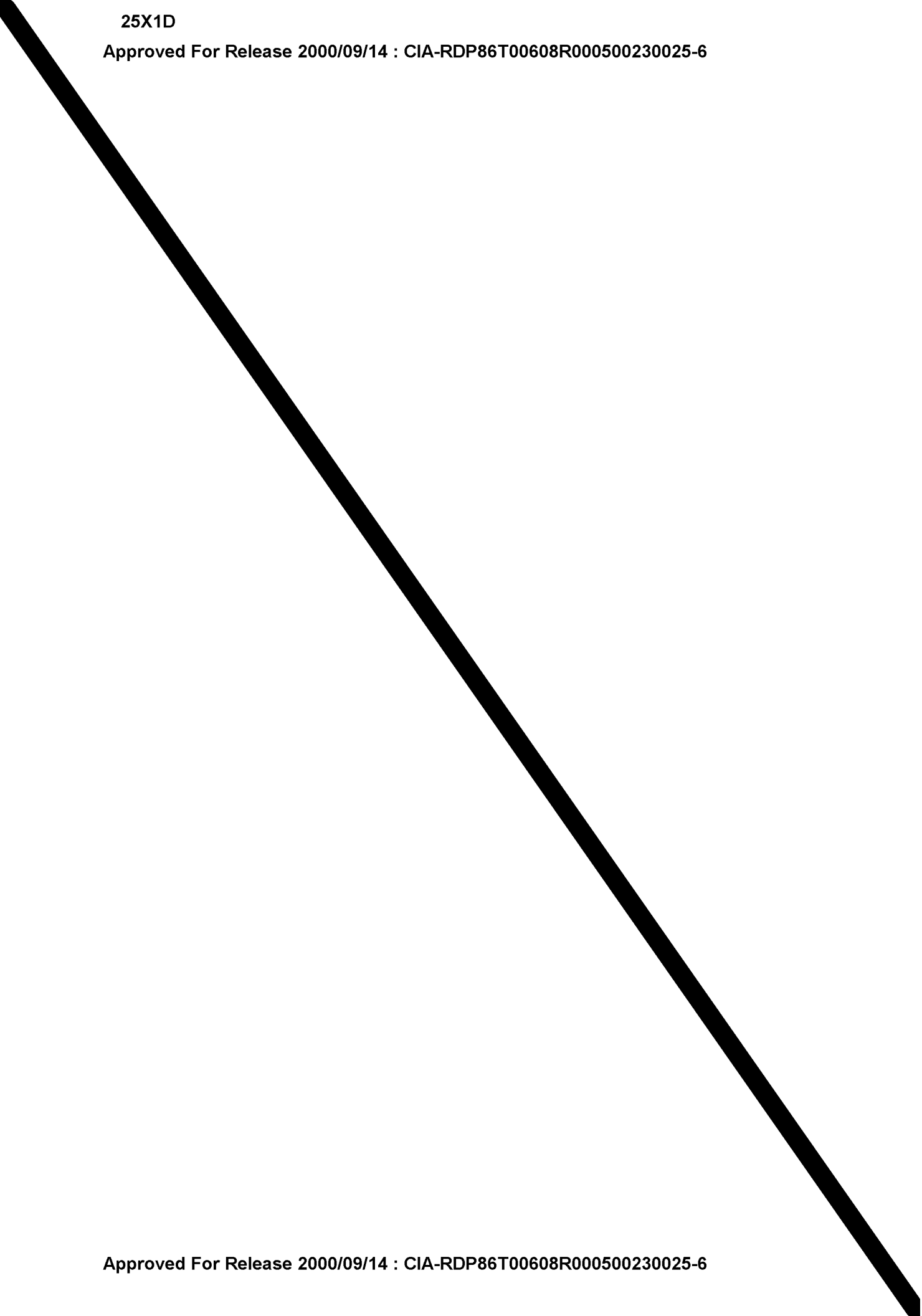
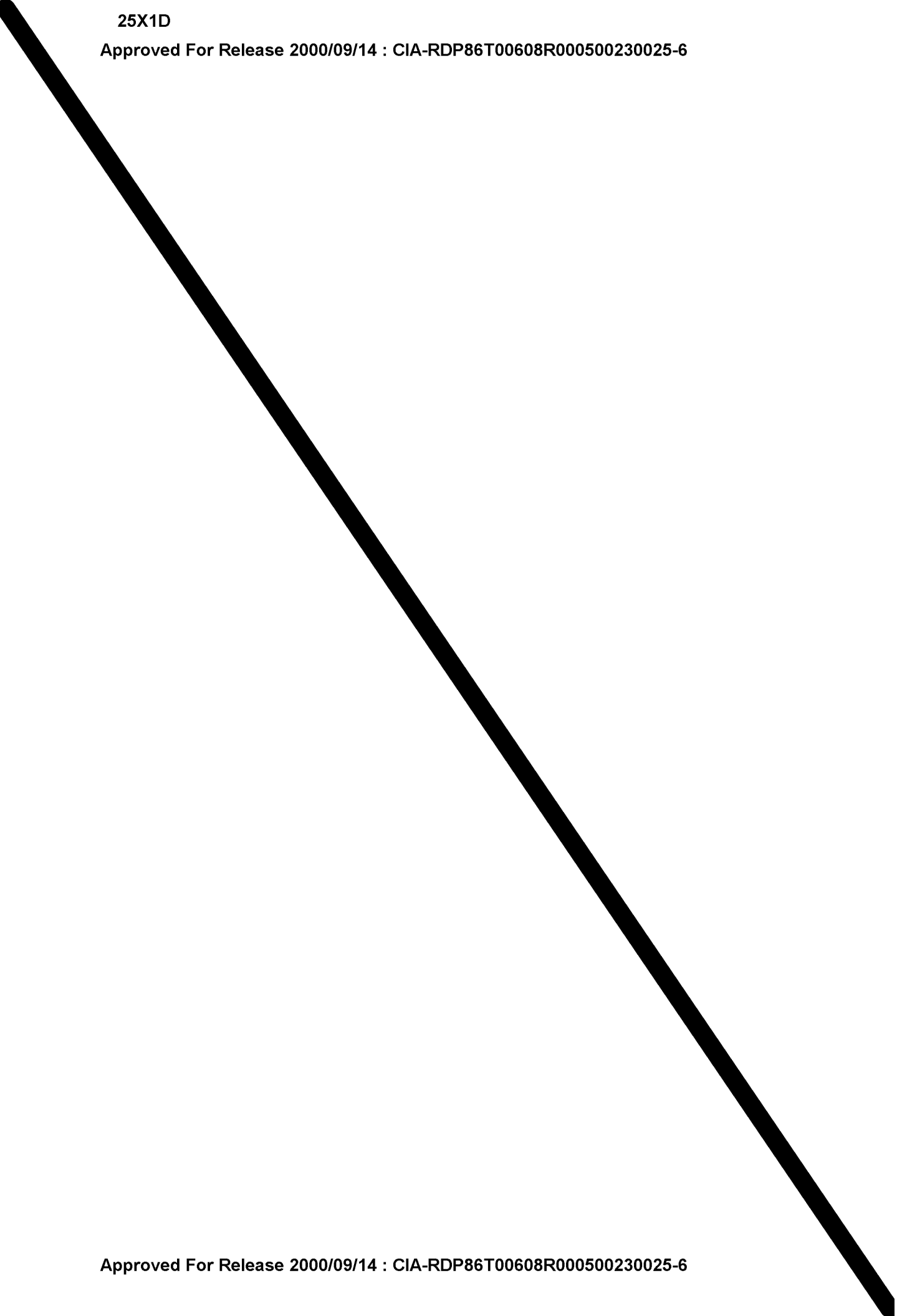
Black Sea Ports

Odessa is located on the northwestern coast of the Black Sea. The port contains 37 berths, four of which are located along two grain piers. The grain piers are connected by conveyor to two 72-unit grain elevators and other grain storage and handling facilities in the port area. Since mid-1972, ships have also [redacted] 25X1D at 13* different general cargo berths offloading grain into rail cars and barges via quay cranes, suction transfer trailers, and a suction transfer barge. Odessa is the main grain port in the Black Sea, handling nearly one-third of US grain exports to the Soviet Union in 1973.

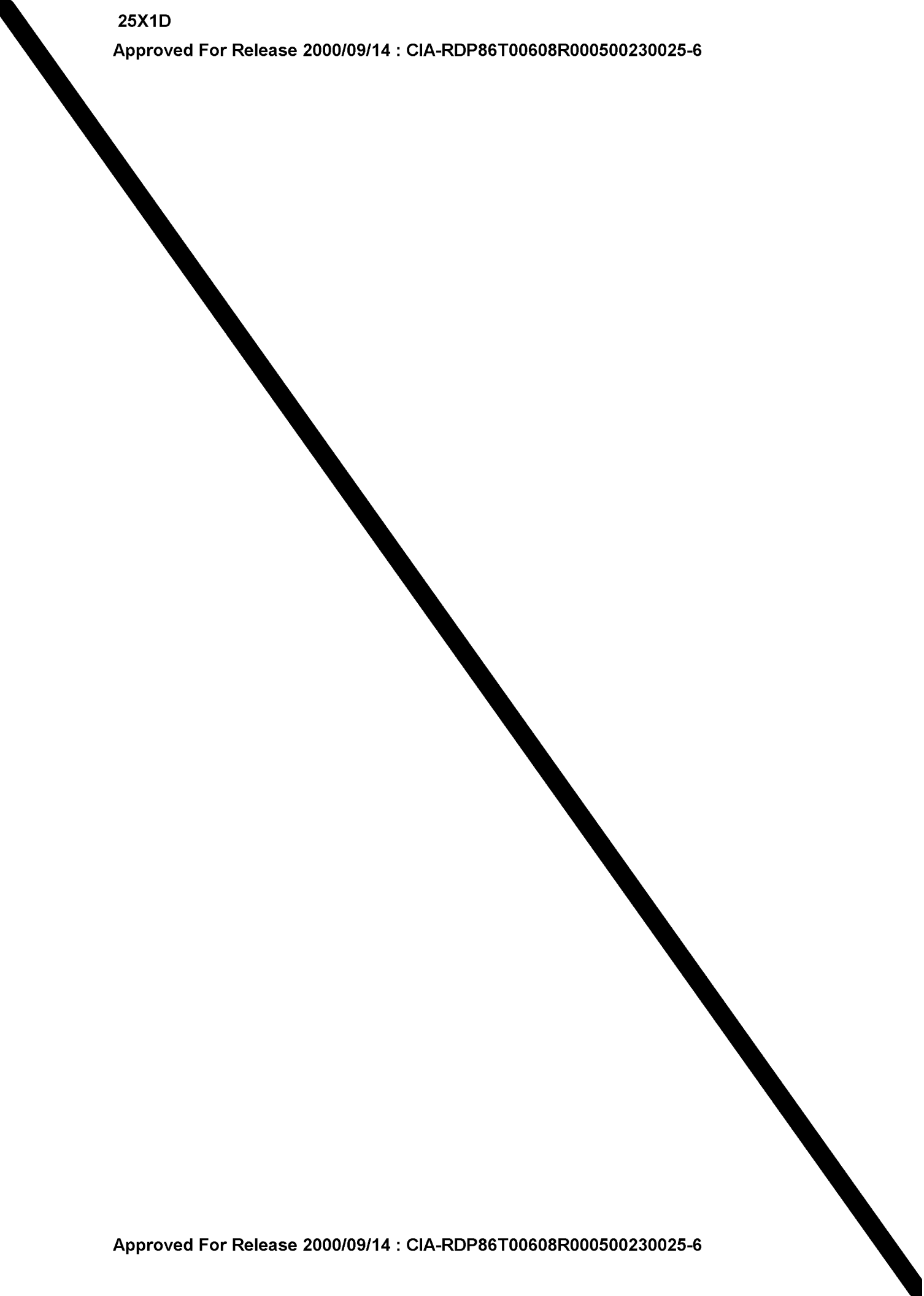
* A maximum of 8 berths were seen at any one time (see Table 3).



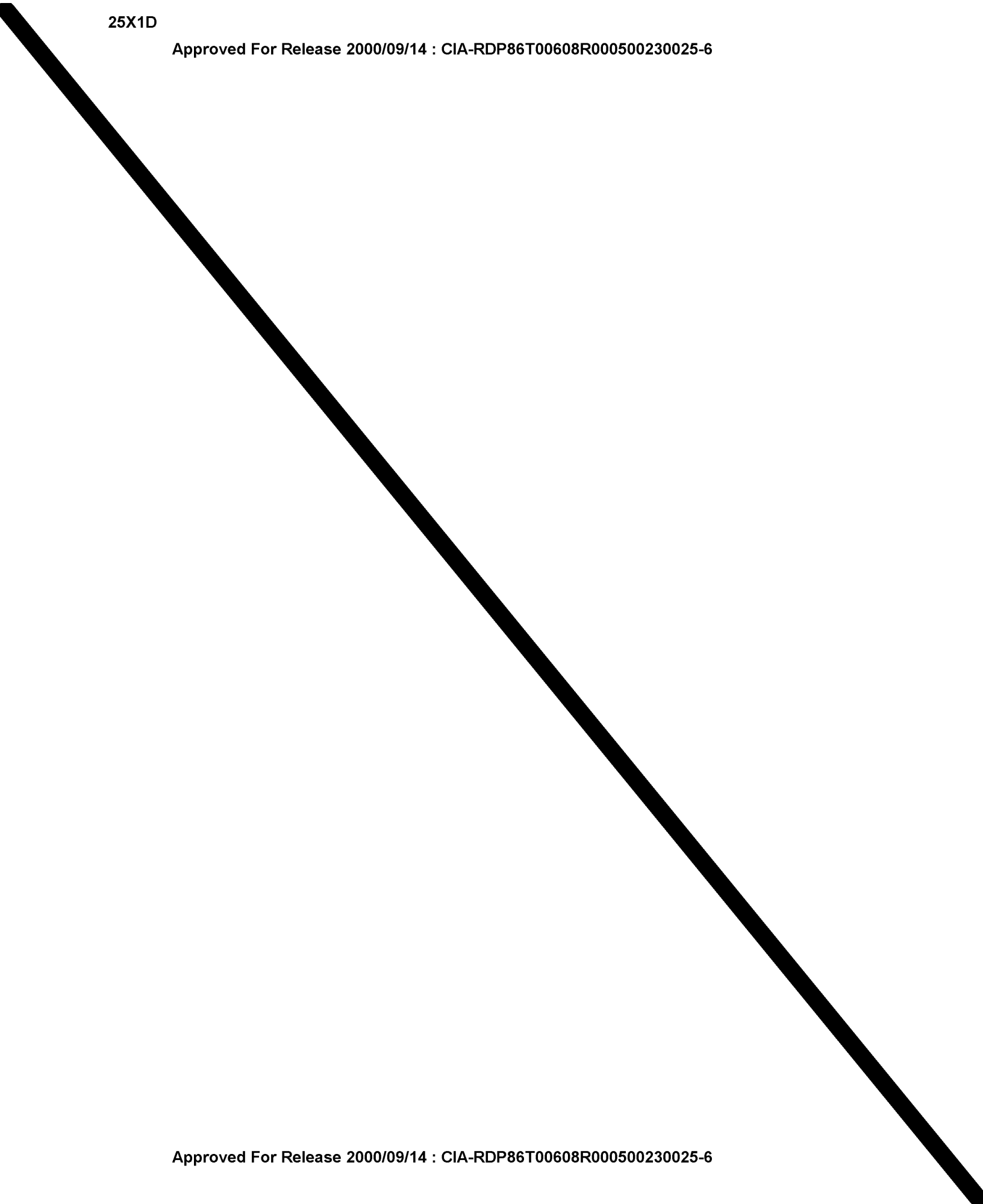
Novorossiysk is located on the north-central coast of the Black Sea. The port contains a total of 43 berths, four of which are located along a grain pier. The grain pier is connected by a conveyor to a large grain storage area containing two 50-unit grain elevators, eight large storage buildings, and a grain handling building. Since mid-1972, ships [redacted] at five different general cargo berths offloading grain into rail cars via suction transfer trailers and quay cranes. 25X1D



Ilichevsk is located on the northwestern coast of the Black Sea, approximately nine nautical miles southwest of Odessa. The port has a total of 24 berths, but none exclusively designed for the transfer of grain. There are no grain storage facilities in the port area. Since mid-1972, ships [redacted] at three general cargo berths offloading grain into rail cars and barges via quay cranes and suction transfer trailers. 25X1D



Poti is located on the eastern coast of the Black Sea, approximately 39 nautical miles north of the Turkish border. The port has a total of 14 berths. There is a grain quay with one berth, two large grain handling/storage buildings interconnected by a conveyor, and a 24-unit grain elevator. The grain elevator has been built since late 1972 to replace one which had exploded earlier that year. Since mid-1972, ships [redacted] offloading grain at two general cargo berths into rail cars via suction transfer trailers and quay cranes. 25X1D



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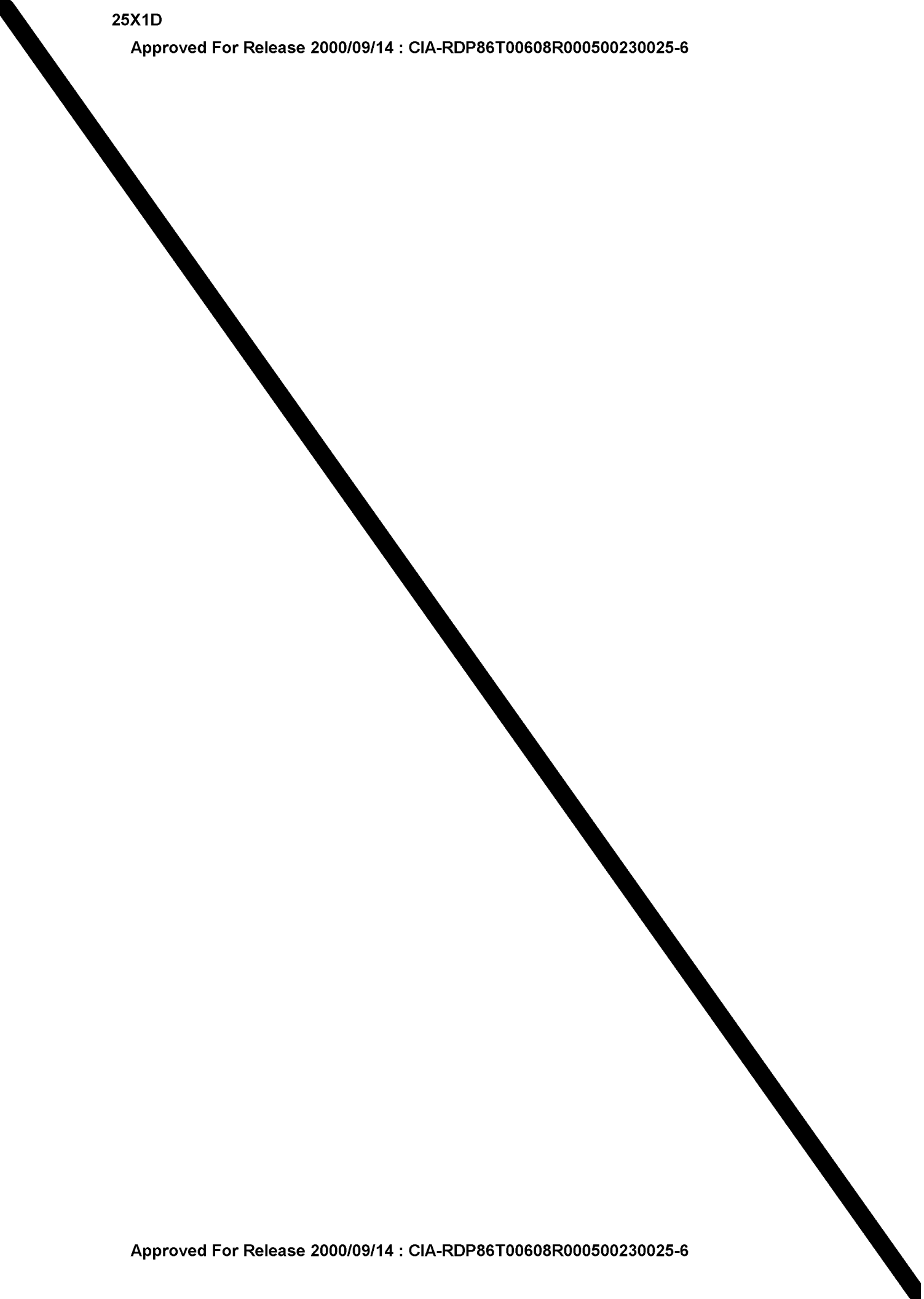
Batumi is located on the east coast of the Black Sea, just north of the Turkish border. The port contains a total of six berths, but none are grain berths. There are no grain storage facilities in the port area. Since mid-1972, ships have been

25X1D [redacted] two of the general cargo berths offloading grain into rail cars. Until 1974, most grain was offloaded by use of ship and quay cranes. In 1974, two rail-mounted suction transfer elevators were erected to facilitate offloading.



Nikolayev is located approximately 52 nautical miles up the Yuzhnyy Bug (river) from the Black Sea. The port contains a total of 28 berths, two of which are along grain quays. Both grain quays are connected directly to grain elevators, one of which is at least a 220 unit elevator. Since mid-1972, ships have also been

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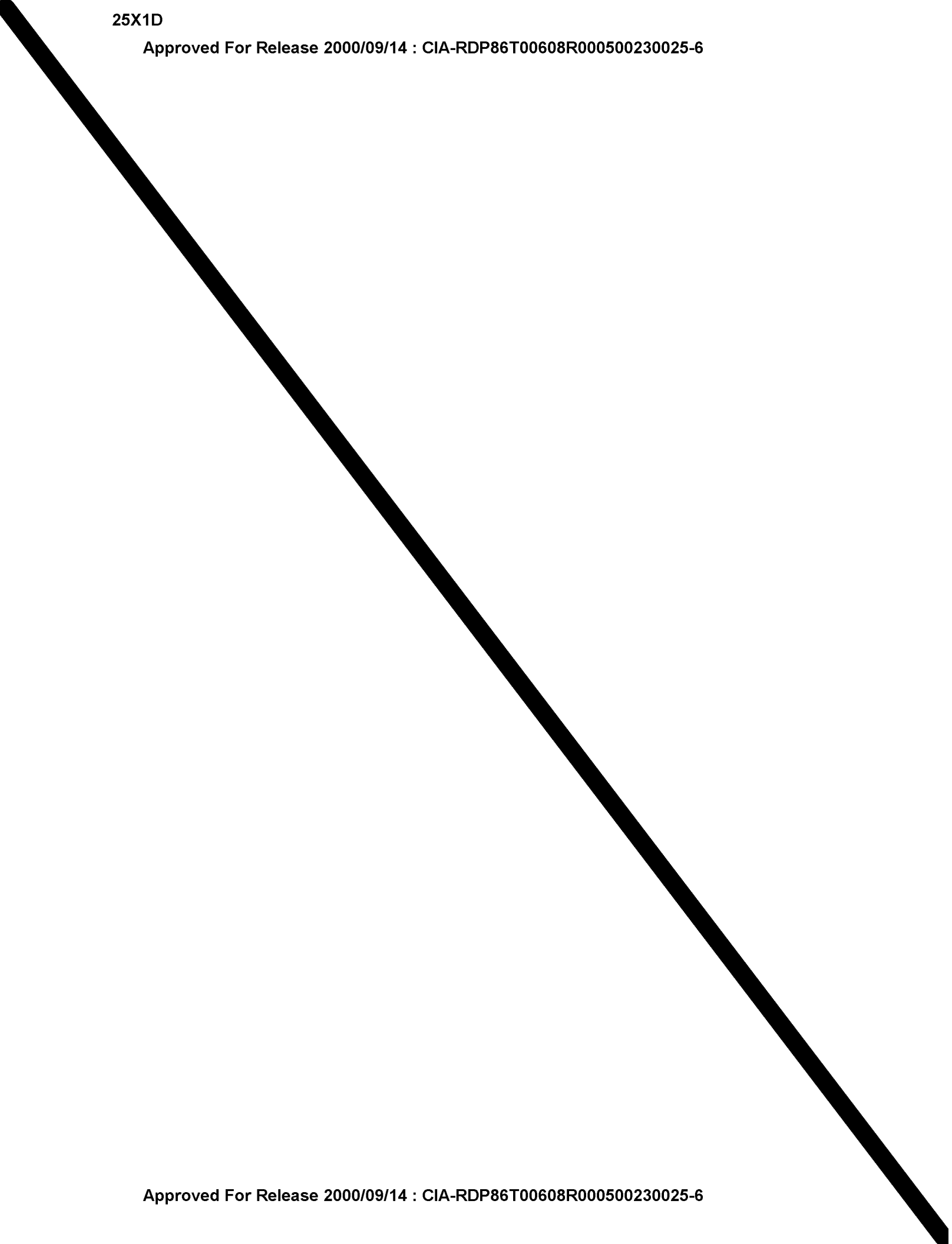
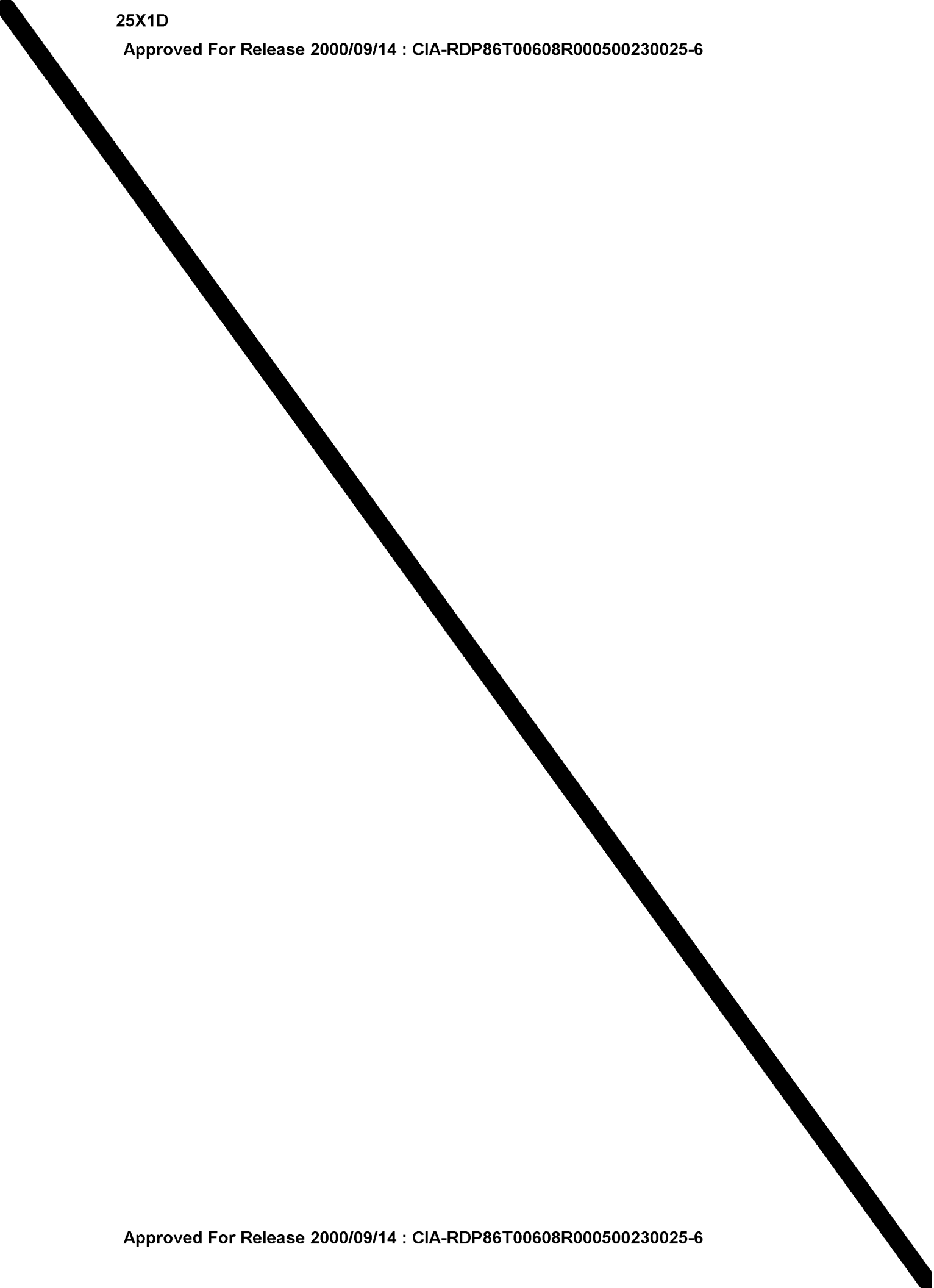
[redacted] two general cargo berths offloading grain into rail cars via quay cranes and into barges via a suction transfer barge.



Tuapse is located on the northeastern coast of the Black Sea, approximately 55 nautical miles southeast of Novorossiysk. The port contains a total of 10 berths, but none exclusively designed for the transport of grain. There are no grain storage facilities in the port area. No ships [redacted] offloading grain at general cargo quays since mid-1972, and no grain hoppers or other types of grain handling equipment have been identified. 25X1D



Kherson is located approximately 43 nautical miles up the Dnieper River from the Black Sea. It is the only maritime port on the Dnieper which connects with the extensive inland waterway system leading to the Bug and Vistula in Poland. The port has a total of 12 berths, two of which are at the grain quay. A conveyor connects the grain quay with a 55-unit grain elevator. Five grain storage buildings and eight small grain silos are adjacent to the elevators. Since mid-1972, grain has [redacted] offloaded at the grain quay via suction transfer barge into barges. No offloading of grain [redacted] at any of the general cargo berths.

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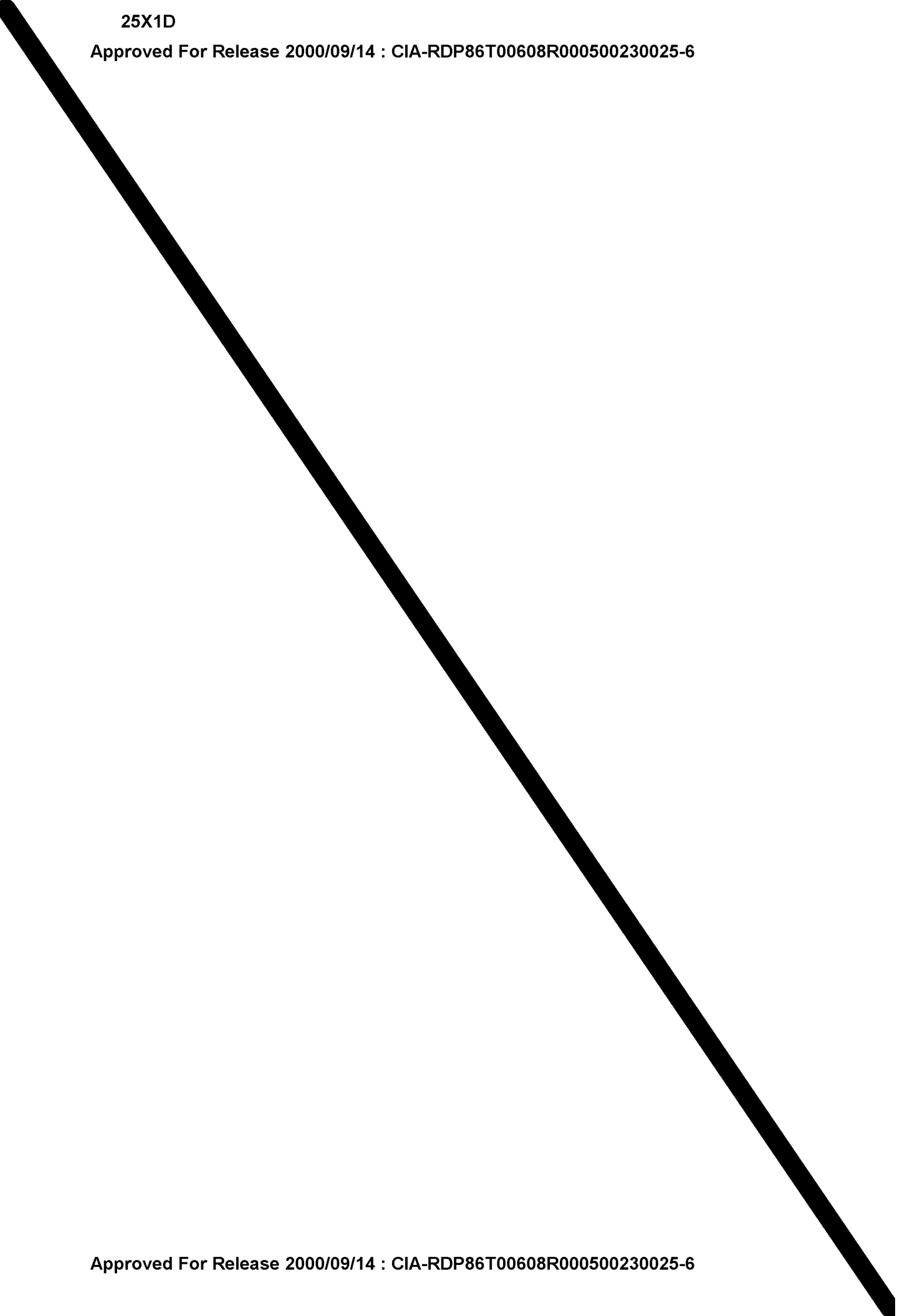
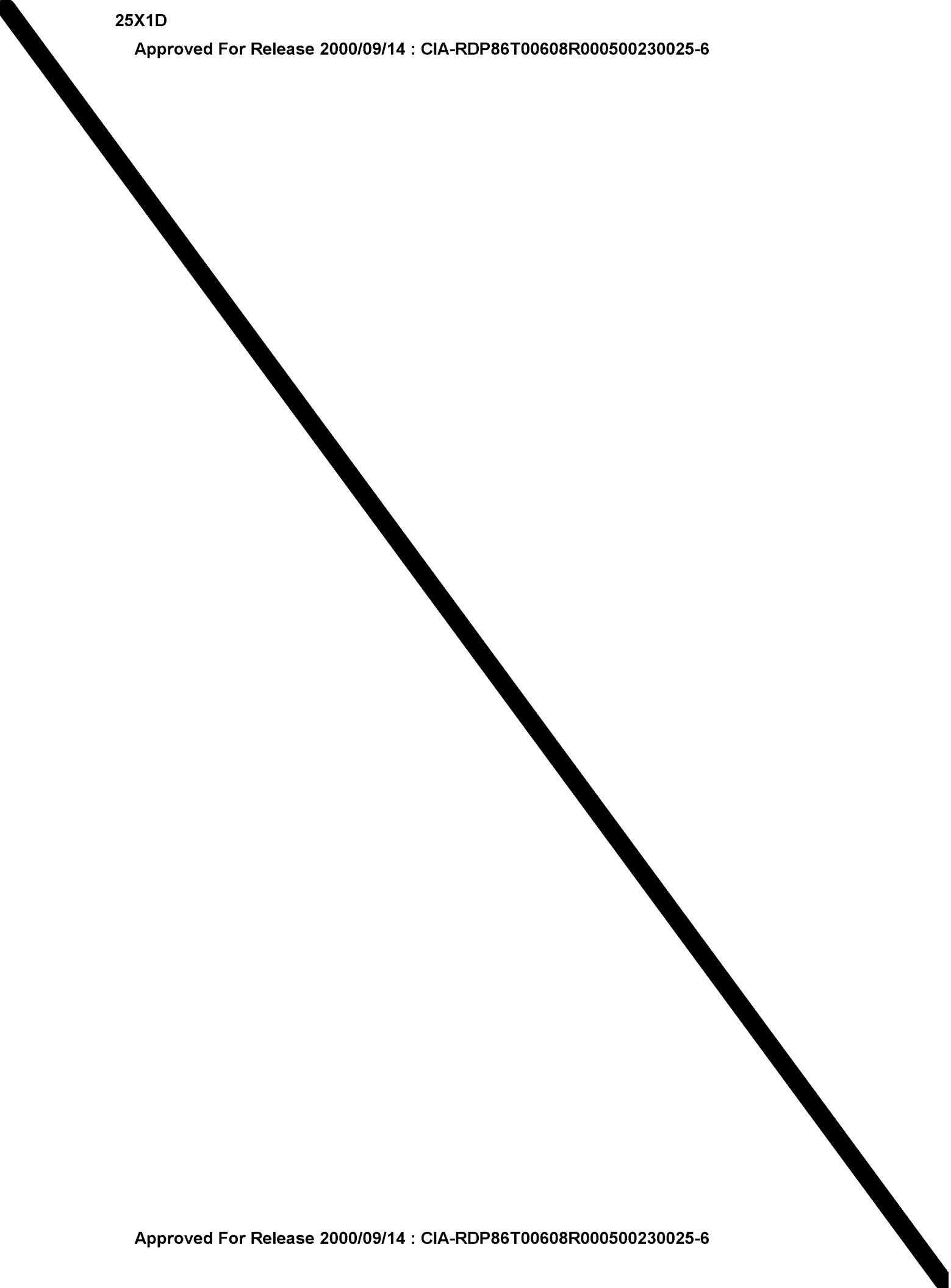


Zhdanov is located on the northeastern coast of the Sea of Azov. The port has a total of 22 berths, two of which are located along a grain pier. A conveyor connects the pier to a 55-unit elevator. Six other grain storage buildings are located at the port. No ships [redacted] offloading grain at any of the general cargo berths since mid-1972. 25X1D



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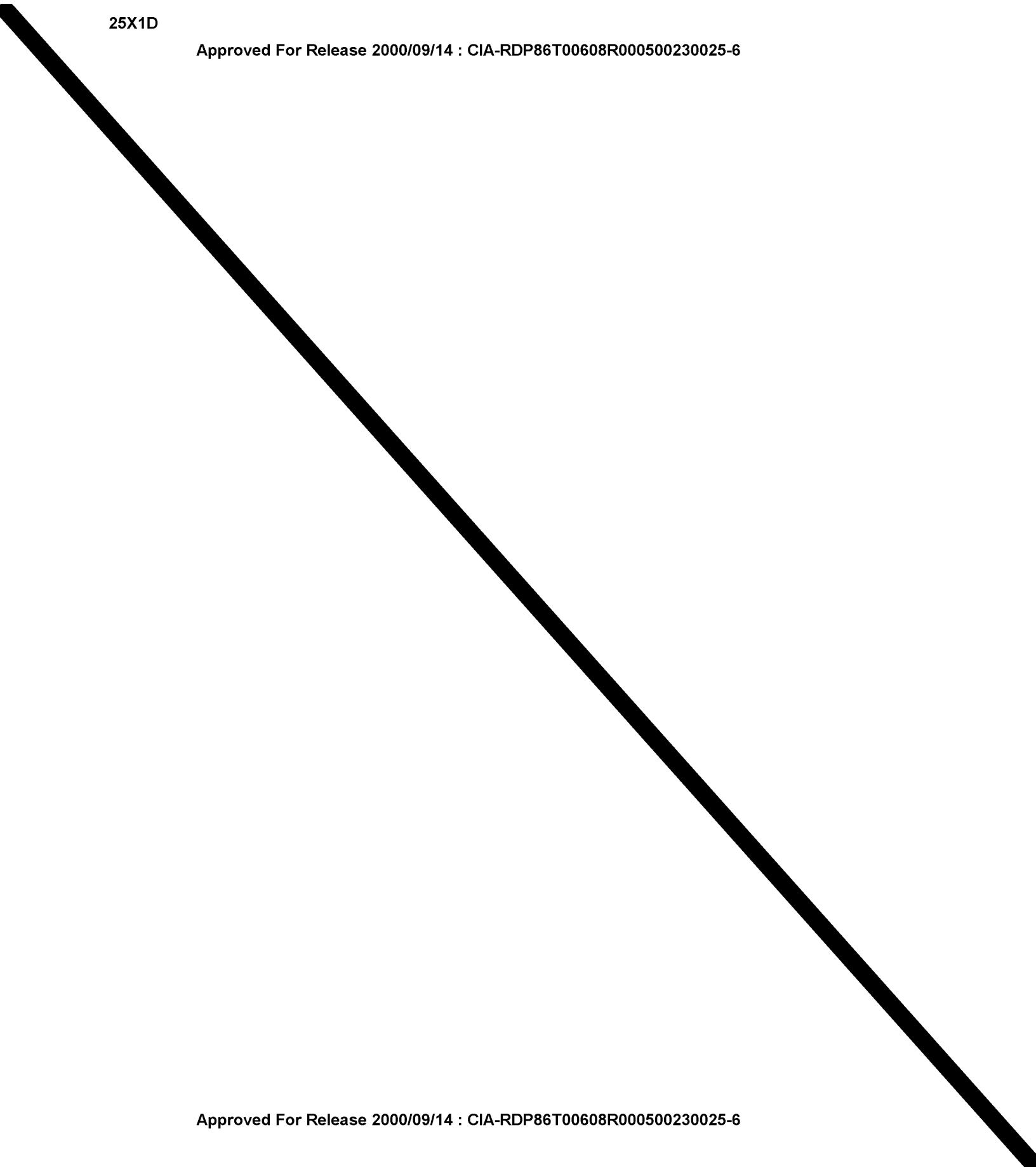
Baltic Ports

Leningrad is located at the east end of the Gulf of Finland. The port contains a total of 89 berths, three of which are located along a grain quay. A 16-unit grain elevator and two grain storage buildings are connected by conveyors to the grain quay. Since mid-1972, ships [redacted] at three different general cargo berths offloading grain into rail cars via quay cranes and suction transfer trailers. 25X1D



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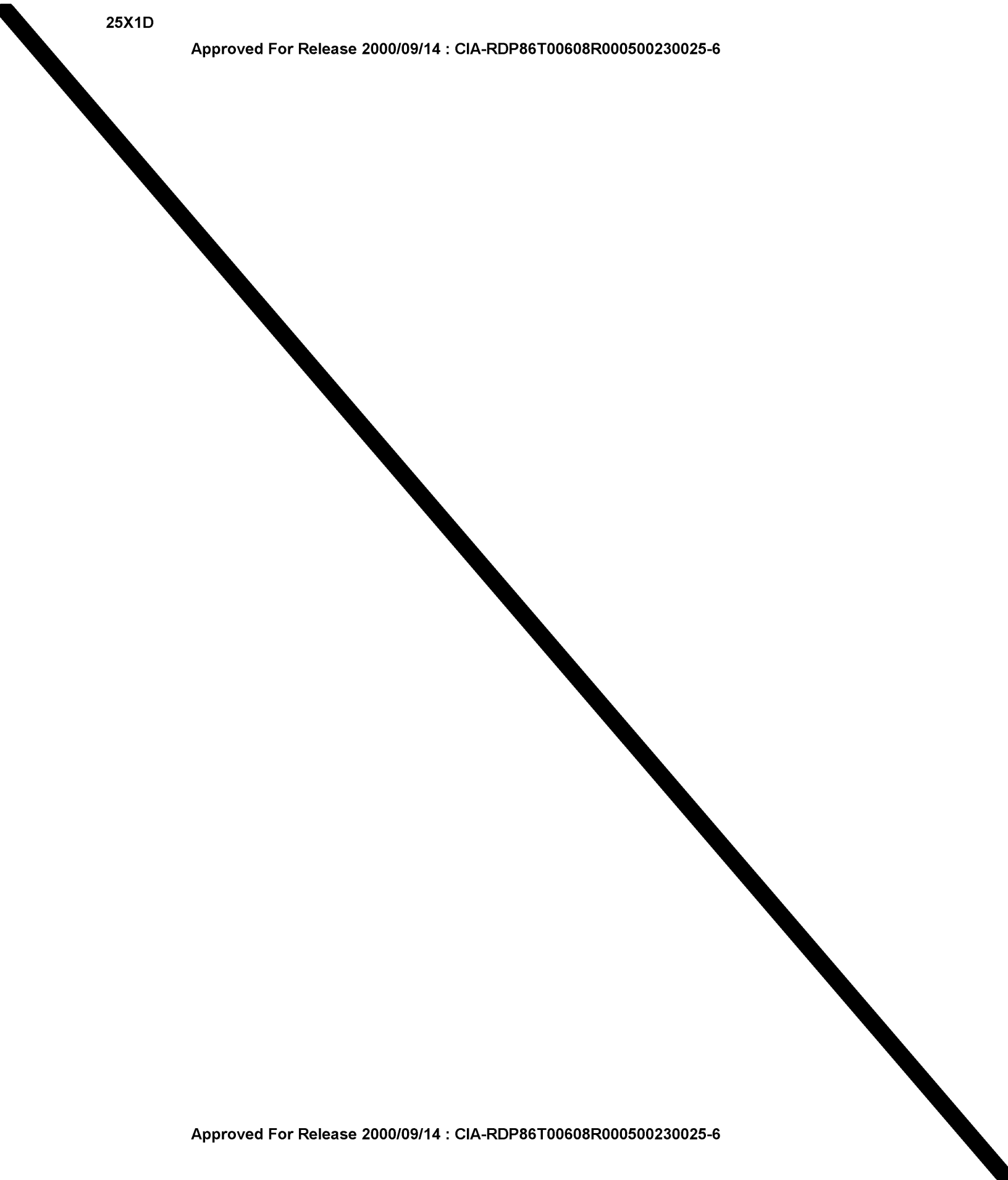
Klaipeda is located on the southeastern coast of the Baltic Sea. The port contains a total of 30 berths, but none exclusively designed for the transfer of grain. There are no grain storage facilities in the port area. Since mid-1972, ships occasionally [redacted] one of the general cargo berths offloading what appeared to be grain. 25X1D



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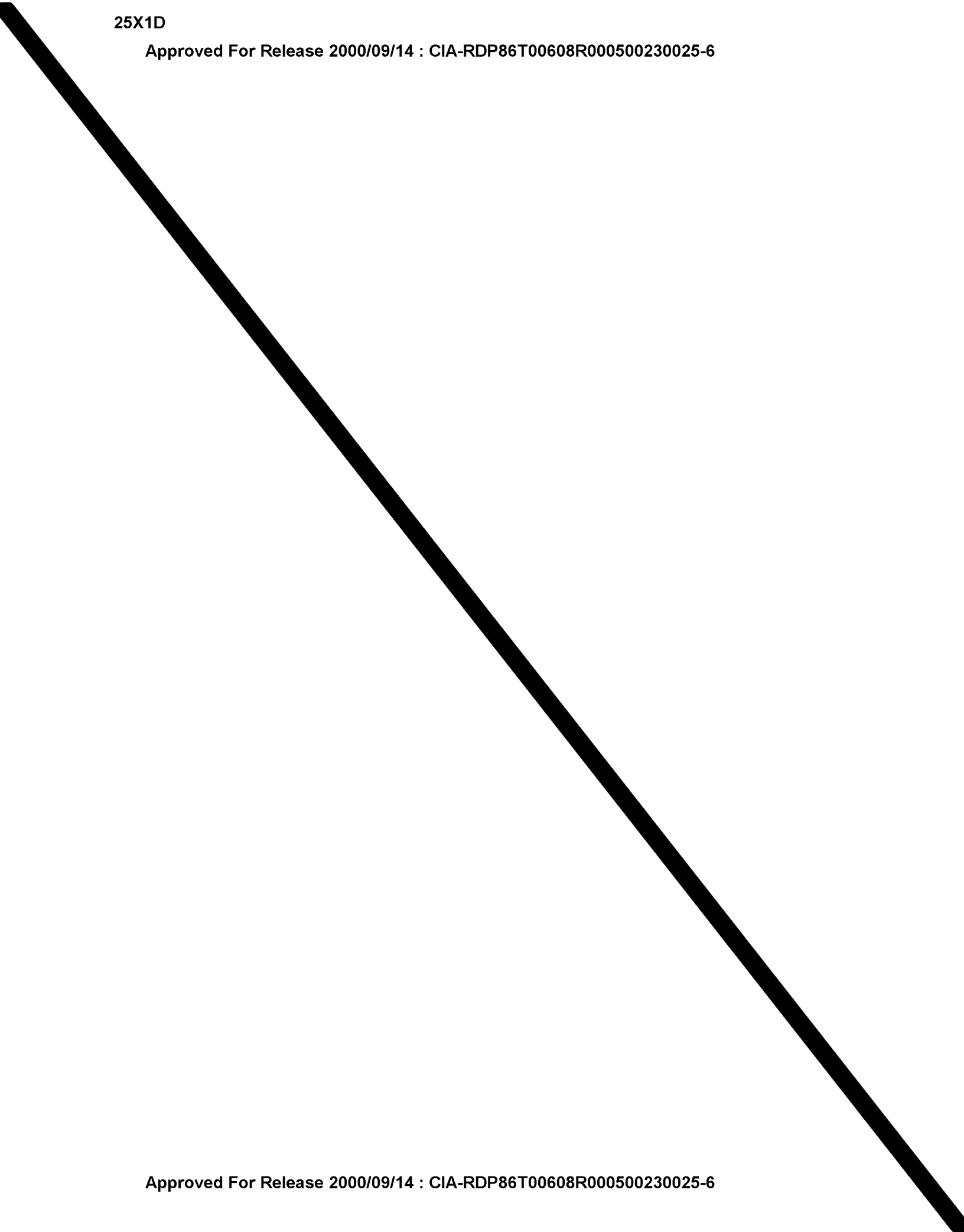
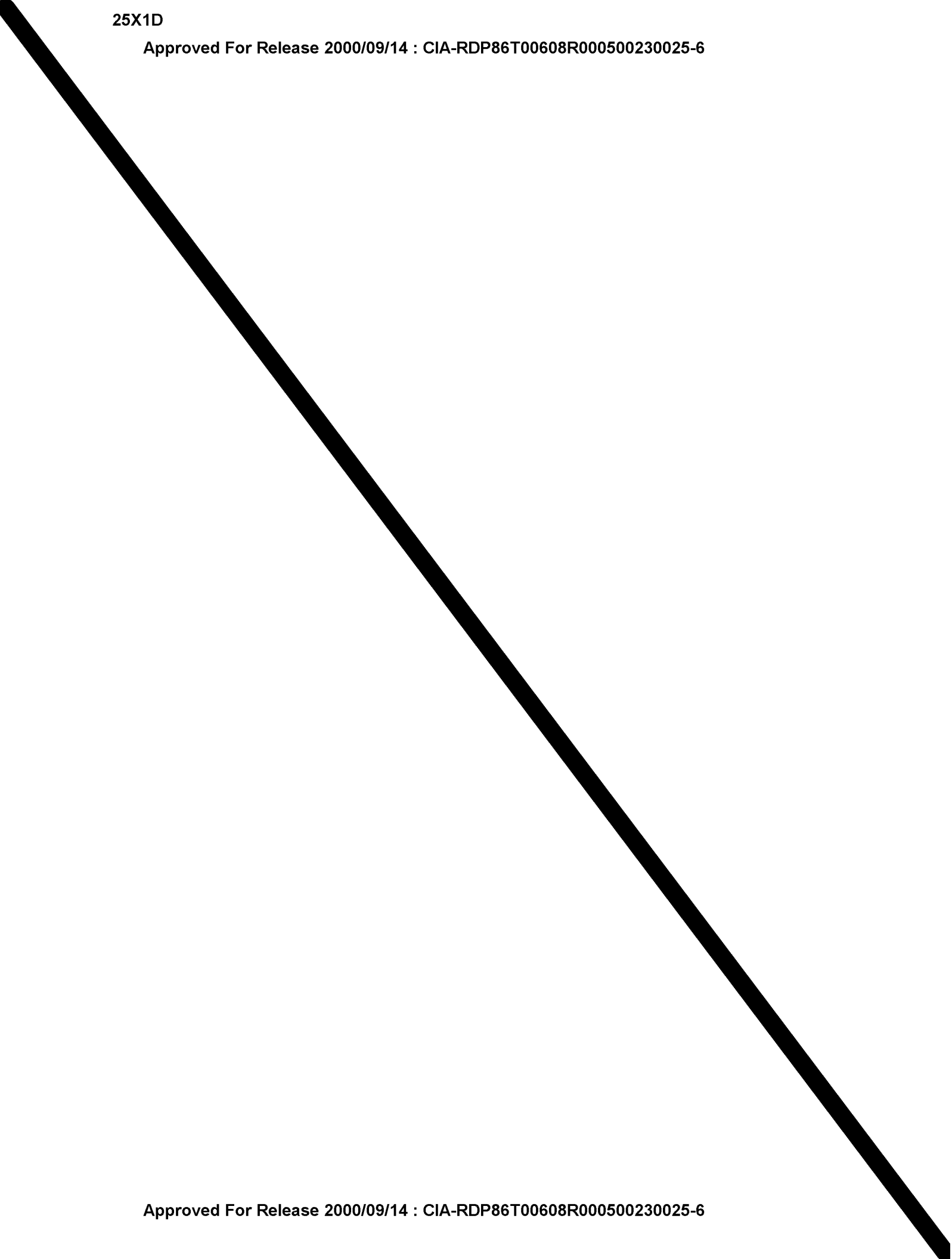
Riga is a river port located on the southern end of the Gulf of Riga. The port has a total of 46 berths, two of which are at grain quays. The grain quays are connected by conveyors to a 60-unit grain elevator and two grain storage buildings. Since mid-1972, ships [redacted] two general cargo berths offloading grain into rail cars via quay cranes. 25X1D



Ventspils is located on the eastern coast of the Baltic Sea at the mouth of the Venta River. The port contains a total of 23 berths, two of which are located along a grain quay. Three grain storage buildings and two grain handling buildings are adjacent to the quay. Since mid-1972, ships [redacted] two general cargo berths offloading grain into rail cars via quay cranes. 25X1D



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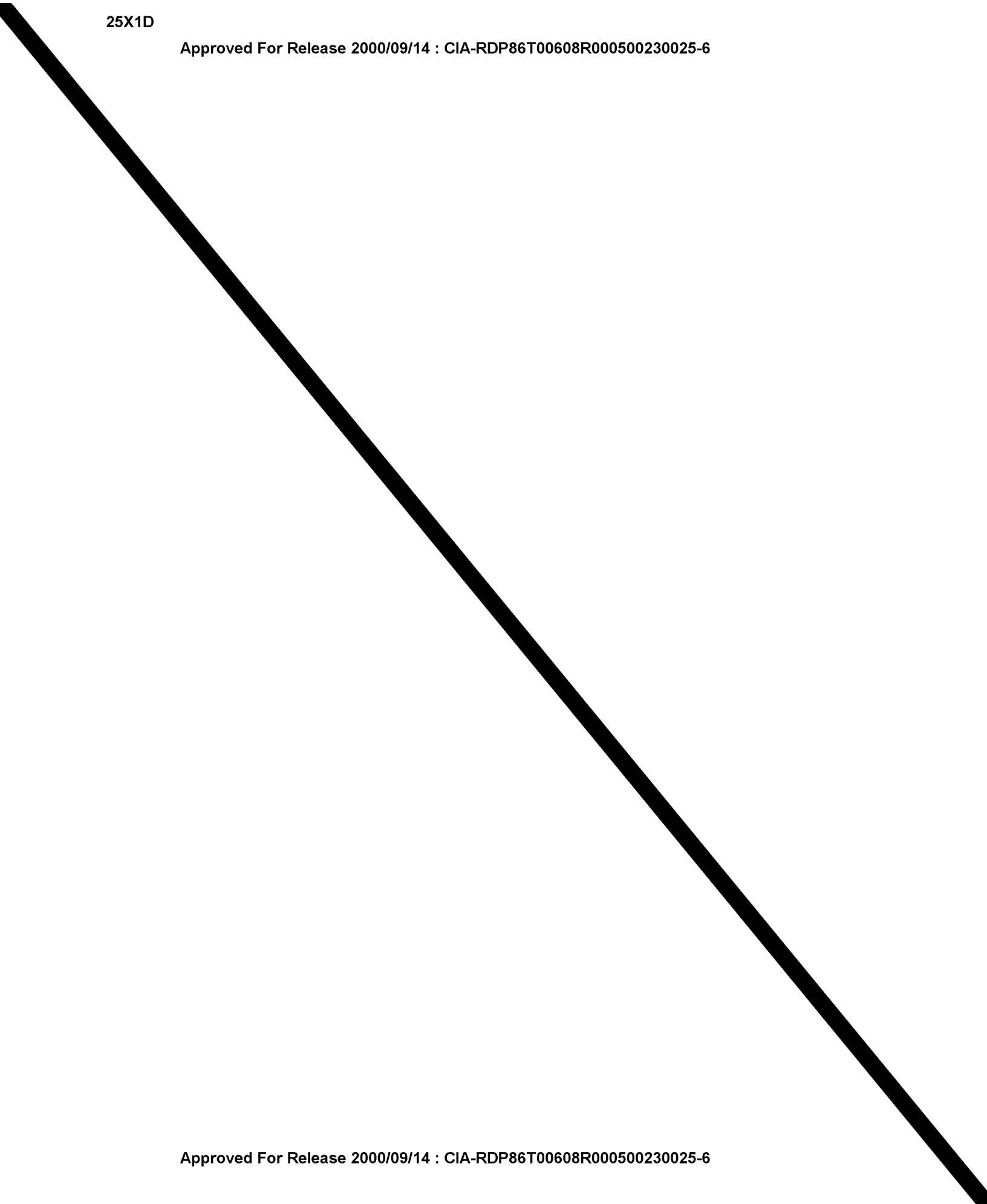
Tallinn is located on the south coast of the Gulf of Finland. The port contains a total of 31 berths, but none exclusively designed for the transfer of grain. There are also no grain storage facilities in the port area. Since mid-1972, ships have 25X1D [redacted] five different general cargo berths offloading grain into rail cars via quay cranes.



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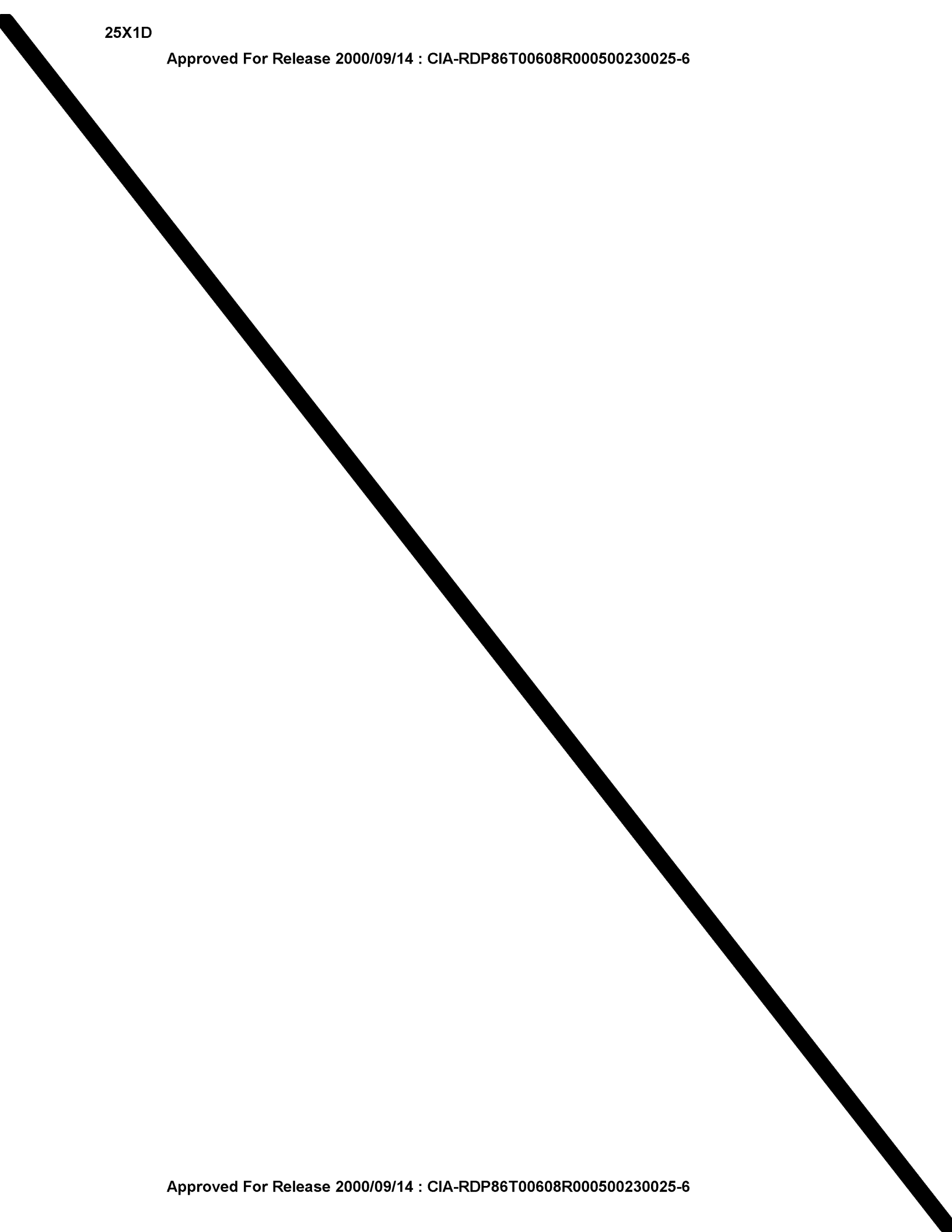
Kaliningrad is located on the Pregolya River about three nautical miles upstream from the Gulf of Danz'g. The port contains a total of 48 berths, three of which are along two grain quays. A grain storage building is located along each of the grain berths. Since mid-1972, ships [redacted] three of the general cargo berths offloading grain into rail cars and barges via quay cranes and a floating crane. 25X1D



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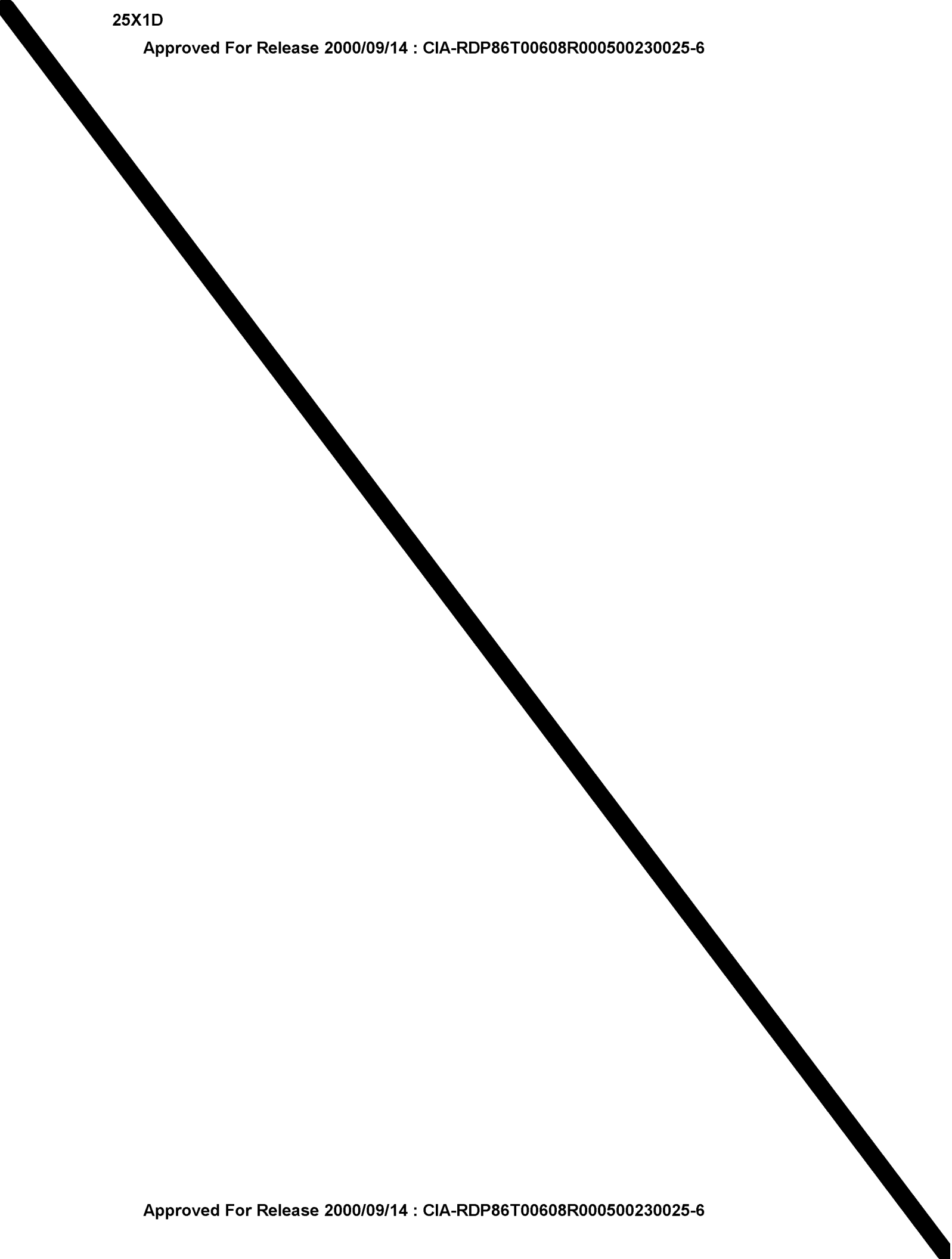
Baltiysk is located on the Baltic Sea approximately 16 nautical miles north of the Polish border. It is the principal operating base for the Baltic Fleet and non-Soviet ships reportedly are prohibited from entering the port. No grain quays or grain transfer or storage facilities are located in the port area. A fixed mooring platform located approximately three nautical miles from the port is used for the transfer of cargo from ships into barges. Since mid-1972, cargo ships have been

25X1D [redacted] at the mooring platform offloading what appeared to be grain into barges via a floating crane and, on one occasion, via a possible suction transfer barge.



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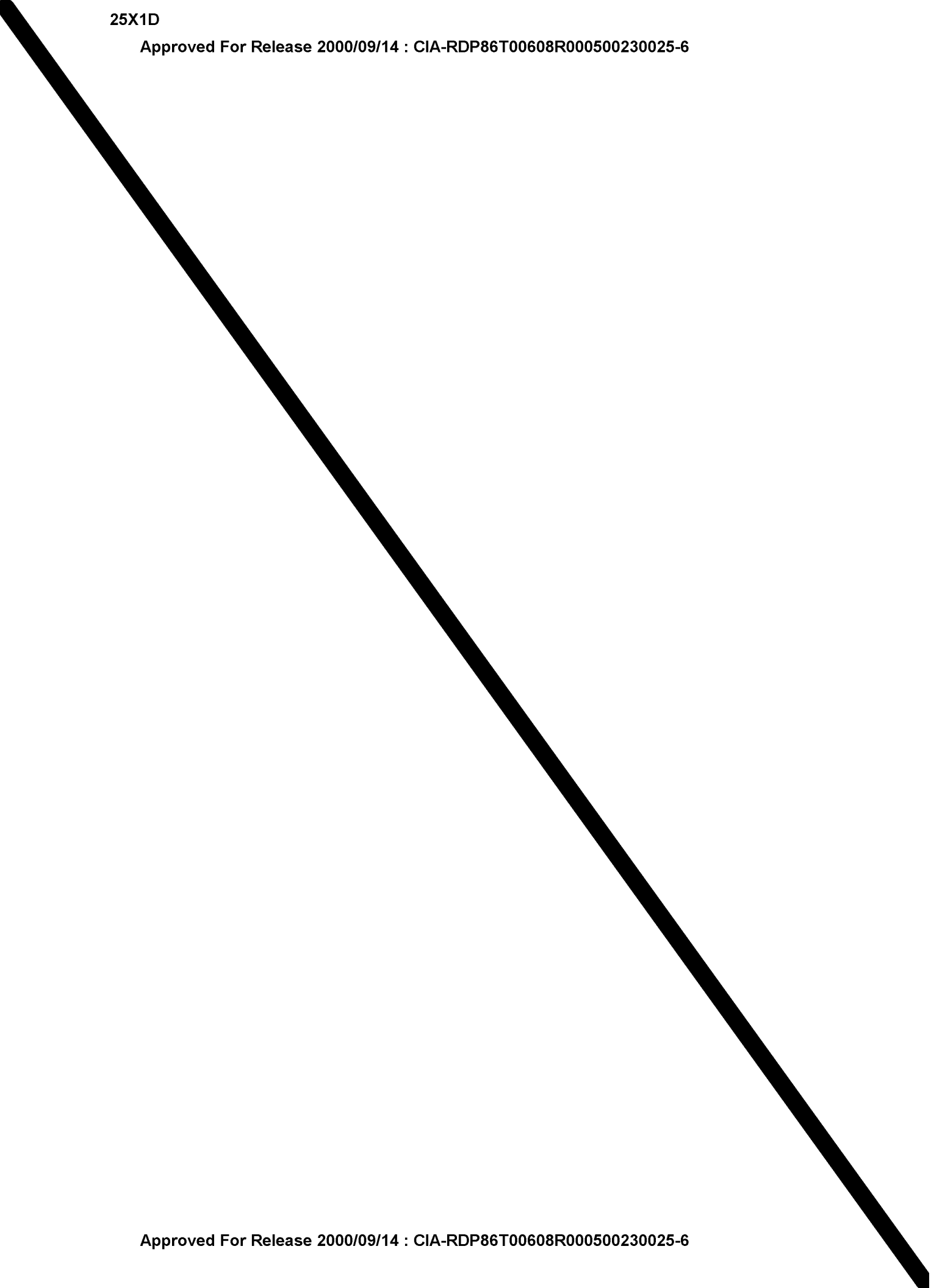
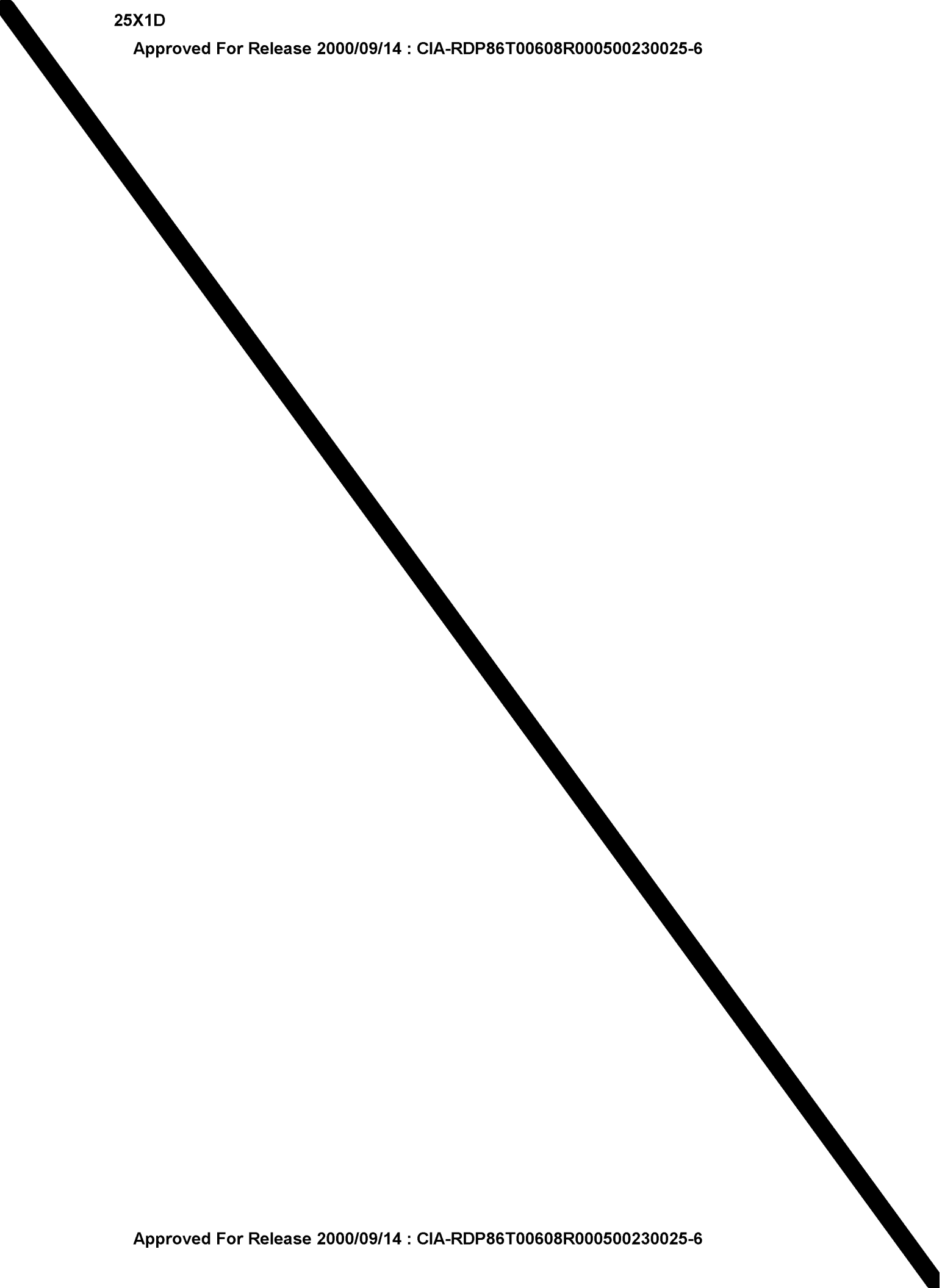
Pacific Ports

Nakhodka is located in the Soviet Far East, approximately 44 nautical miles southeast of Vladivostok. The port contains a total of 37 berths, one of which is along a grain quay. Three suction cranes on the grain quay are available to transfer grain from ships to a grain handling building, which is rail served. Since mid-1972, ships [redacted] two general cargo berths offloading grain into rail cars via quay cranes. 25X1D



Vladivostok is located on the western coast of the Sea of Japan. The port contains a total of 40 berths, none of which is exclusively designed for the transfer of grain. No grain storage facilities are confirmed in the port, but some are available about three miles to the north. Since mid-1972, ships [redacted] two general cargo berths offloading grain into rail cars via quay cranes. 25X1D



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